

# Accident Countermeasures

The former requirement for reporting accidents to the Federal Motor Carrier Safety Administration (FMCSA) (accident notification under **49 CFR Part 394**) has been replaced with a new requirement for retaining and analyzing accident information.

## Background

As part of the ongoing FMCSA safety management effort to reduce the number of vehicle accidents on highways, assistance by safety specialists in accident analysis and countermeasures planning is now an integral part of compliance reviews conducted by the FMCSA. Accident countermeasures are examples of defensive strategies designed to reduce preventable accidents.

## Purpose

This folder is designed to provide motor carriers and drivers with an introduction to the concepts of preventability analysis and accident countermeasures. The material suggests practical measures that can be taken now to prevent accidents, though its main intent goes further. The core of the presentation is a series of case histories of successful countermeasures. These are true stories of industry successes in promoting highway safety. The case histories are presented, together with a guide called *Determining Preventability of Accidents*, to help readers analyze accidents and create strategies to keep similar accidents from happening in the future.

The FMCSA intends to stimulate thinking and discussion about accident preventability and prevention within the motor carrier industry. The preventability guide and the *Accident Countermeasures* cases are not rating sheets nor orders from above to be followed exactly. They are guidelines and discussion tools to help carriers and drivers look at their unique operations and practices with an eye to identifying opportunities to make safety improvements.

## Determining preventability

No two accidents or carriers are exactly alike, and the FMCSA recognizes that not all accidents are preventable. Some types of accidents, furthermore, can be prevented by drivers, while others require changes in motor carrier practices and policies or equipment. The new FMCSA method for determining preventability is based on examination of the facts in accident records.

## Cases and countermeasures

The countermeasures cases in this file actually occurred. They are true success stories that show how relatively modest improvements led to significant reductions in accident rates.

## Contents and attachments

This section contains *A Guide to Determining Preventability of Accidents* and *Accident Countermeasures: Success Stories*. Attachments include an *Accident Register* form and a chart, *Revenue Necessary to Pay for Accident Losses*.

You are welcome to reproduce and distribute any of the materials in this booklet.

## A Guide to Determining Preventability of Accidents

The heart of accident analysis is the determination of preventability, based on the facts furnished in the motor carrier's recordable accident register, and from various other sources. These sources of information must be evaluated in light of all available facts that are pertinent to the cause of the accident. Digging out these facts from the information on these reports can be difficult in practice due to the limited data contained in some reports. But the information can be obtained in many instances by a detailed analysis and reconstruction of the accident sequence.

Each accident must be judged individually. Certain types will generally fall in the non-preventable category, and certain others, in the absence of extenuating circumstances and conditions, fall in the preventable category. The types of accidents listed below do not cover every accident that may occur, but they are intended to provide general guidance to assist in determining preventability.

### Non-Preventable Accidents

#### Struck in Rear by Other Vehicle

- |                           |   |
|---------------------------|---|
| <b>Non-preventable if</b> | <ul style="list-style-type: none"><li>• Driver's vehicle was legally and properly parked</li><li>• Driver was proceeding in his/her own lane of traffic at a safe and lawful speed</li><li>• Driver was stopped in traffic due to existing conditions or was stopped in compliance with traffic sign or signal or the directions of a police officer or other person legitimately controlling traffic</li><li>• Driver was in proper lane waiting to make turn.</li></ul> |
|---------------------------|---|

#### Struck While Parked

- |                           |   |
|---------------------------|---|
| <b>Non-preventable if</b> | <ul style="list-style-type: none"><li>• Driver was properly parked in a location where parking was permitted</li><li>• Vehicle was stopped, parked, or left standing in accordance with Sections 392.21 and 392.22 of the Federal Motor Carrier Safety Regulations.</li></ul> |
|---------------------------|---|

### Preventable Accidents

#### Accidents at Intersections

- |                       |  |
|-----------------------|--|
| <b>Preventable if</b> | <ul style="list-style-type: none"><li>• Driver failed to control speed so that he/she could stop within available sight distance</li><li>• Driver failed to check cross-traffic and wait for it to clear before entering intersection</li><li>• Driver pulled out from side street in the face of oncoming traffic</li><li>• Driver collided with person, vehicle, or object while making right or left turn</li><li>• Driver collided with vehicle making turn in front of him/her.</li></ul> |
|-----------------------|--|

#### Striking Other Vehicle in Rear

- |                       |   |
|-----------------------|---|
| <b>Preventable if</b> | <ul style="list-style-type: none"><li>• Driver failed to maintain safe following distance and have his/her vehicle under control</li><li>• Driver failed to keep track of traffic conditions and did not slow down</li><li>• Driver failed to ascertain whether vehicle ahead was moving slowly, stopped, or slowing down for any reason</li><li>• Driver misjudged rate of overtaking</li><li>• Driver came too close before pulling out to pass</li></ul> |
|-----------------------|---|

- Driver failed to wait for vehicle ahead to move into the clear before starting up
- Driver failed to leave sufficient room for passing vehicle to get safely back in line.

### **Sideswipe and Head-on Collisions**

- |                       |  |
|-----------------------|--|
| <b>Preventable if</b> | <ul style="list-style-type: none"> <li>• Driver was not entirely in his/her proper lane of travel</li> <li>• Driver did not pull to right and slow down or stop for vehicle encroaching on his/her lane of travel when such action could have been taken without additional danger.</li> </ul> |
|-----------------------|--|

### **Struck in Rear by Other Vehicle**

- |                       |  |
|-----------------------|--|
| <b>Preventable if</b> | <ul style="list-style-type: none"> <li>• Driver was passing slower traffic near an intersection and had to make sudden stop</li> <li>• Driver made sudden stop to park, load, or unload</li> <li>• Vehicle was improperly parked</li> <li>• Driver rolled back into vehicle behind them while starting on grade</li> </ul> |
|-----------------------|--|

### **Squeeze Plays and Shutouts**

- |                       |  |
|-----------------------|--|
| <b>Preventable if</b> | <ul style="list-style-type: none"> <li>• Driver failed to yield right-of-way when necessary to avoid accident</li> </ul> |
|-----------------------|--|

### **Backing Accidents**

- |                       |   |
|-----------------------|---|
| <b>Preventable if</b> | <ul style="list-style-type: none"> <li>• Driver backed up when backing could have been avoided by better planning of his/her route</li> <li>• Driver backed into traffic stream when such backing could have been avoided</li> <li>• Driver failed to get out of cab and check proposed path of backward travel</li> <li>• Driver depended solely on mirrors when it was practicable to look back</li> <li>• Driver failed to get out of cab periodically and recheck conditions when backing a long distance</li> <li>• Driver failed to check behind vehicle parked at curb before attempting to leave parking space</li> <li>• Driver relied solely on a guide to help him/her back</li> <li>• Driver backed from blind side when he/she could have made a sight-side approach.</li> </ul> |
|-----------------------|---|

### **Accident Involving Rail Operated Vehicles**

- |                       |  |
|-----------------------|--|
| <b>Preventable if</b> | <ul style="list-style-type: none"> <li>• Driver attempted to cross tracks directly ahead of train or streetcar</li> <li>• Driver ran into side of train or streetcar</li> <li>• Driver stopped or parked on or too close to tracks.</li> </ul> |
|-----------------------|--|

### **Accidents While Passing**

- |                       |   |
|-----------------------|---|
| <b>Preventable if</b> | <ul style="list-style-type: none"> <li>• Driver passed where view of road ahead was obstructed by hill, curve, vegetation, traffic, adverse weather conditions, etc.</li> <li>• Driver attempted to pass in the face of closely approaching traffic</li> <li>• Driver failed to warn driver of vehicle being passed</li> <li>• Driver failed to signal change of lanes</li> <li>• Driver pulled out in front of other traffic overtaking from rear</li> <li>• Driver cut in too short while returning to right lane.</li> </ul> |
|-----------------------|---|

### Accidents While Being Passed

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|-----------------------|---|
| <b>Preventable if</b> | <ul style="list-style-type: none"><li>• Driver failed to stay in his own lane and hold speed or reduce it to permit safe passing.</li></ul> |
|-----------------------|---|

### Accidents While Entering Traffic Stream

- |                       |   |
|-----------------------|---|
| <b>Preventable if</b> | <ul style="list-style-type: none"><li>• Driver failed to signal when pulling out from curb</li><li>• Driver failed to check traffic before pulling out from curb</li><li>• Driver failed to look back to check traffic if he/she was in position where mirrors did not show traffic conditions</li><li>• Driver attempted to pull out in a manner that forced other vehicle(s) to change speed or direction</li><li>• Driver failed to make full stop before entering from side street, alley, or driveway</li><li>• Driver failed to make full stop before crossing sidewalk</li><li>• Driver failed to yield right of way to approaching traffic.</li></ul> |
|-----------------------|---|

### Pedestrian Accidents

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|-----------------------|--|
| <b>Preventable if</b> | <ul style="list-style-type: none"><li>• Driver did not reduce speed in area of heavy pedestrian traffic</li><li>• Driver was not prepared to stop</li><li>• Driver failed to yield right of way to pedestrian.</li></ul> |
|-----------------------|--|

### Mechanical Defects Accidents

- |                       |  |
|-----------------------|--|
| <b>Preventable if</b> | <ul style="list-style-type: none"><li>• Defect was of a type that driver should have detected in making pre-trip or enroute inspection of vehicle</li><li>• Defect was of a type that driver should have detected during the normal operation of the vehicle</li><li>• Defect was caused by driver's abusive handling of the vehicle</li><li>• Defect was known to driver, but ignored</li><li>• Driver was instructed to operate with known defect.</li></ul> |
|-----------------------|--|

### All Types of Accidents

- |                       |   |
|-----------------------|---|
| <b>Preventable if</b> | <ul style="list-style-type: none"><li>• Driver was not operating at a speed suitable for the existing conditions of road, weather, and traffic</li><li>• Driver failed to control speed so that he/she could stop within assured clear distance</li><li>• Driver misjudged available clearance</li><li>• Driver failed to yield right-of-way to avoid accident</li><li>• Driver failed to accurately observe existing conditions</li><li>• Driver was in violation of company operating rules or special instructions, the regulations of any Federal or State regulatory agency, or any applicable traffic laws or ordinances.</li></ul> |
|-----------------------|---|

## Accident Countermeasures: Success Stories

References in parentheses are to cases in the **Commercial Vehicle Preventable Accident Manual (Countermeasures Manual)**.

### CASE # 1.

An Oregon-based carrier transporting wood chips from the coast to the Eugene area began to have an unusual number of accidents. An analysis by the Safety Specialist revealed that the majority of the accidents occurred on a three-mile stretch of the route being used. This two-lane road was narrow, winding, and frequented by tourists in summer; and plagued with fog, ice, and snow in winter. Further investigation revealed that for the past eight months construction had been underway along the three-mile stretch - about the same time the accidents had been happening. The highway department indicated that construction would continue for another six months.

### COUNTERMEASURE:

The Safety Specialist discussed the findings with management and recommended the carrier's vehicles be rerouted until the construction was complete.

(Countermeasures Manual Case No. A11-*Planning Schedules, Loads and Routes*)

The carrier realized that it could not continue with the increased level of accidents for another six months and agreed with the recommendation. Although the new route was approximately 30 miles more each way, the benefit of reducing accidents outweighed this.

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### CASE # 2.

An Illinois-based produce hauler was experiencing a high number of driver injuries resulting in a large number of workman compensation claims. A Safety Specialist's review of the accidents revealed that drivers were wrenching their necks inside their cabovers (vs. conventional cabs) when passing over bumps in the road. The drivers were being thrown unexpectedly out of their seats and into the windshield or ceiling of their tractors. The cabovers were identified as being the primary source of these incidents - the driver's seat is located directly over the front wheels and provides little resistance or cushion to reduce the impact of bumps in the road to the driver.

### COUNTERMEASURE:

The Safety Specialist recommended that the carrier insert language into their employee manual requiring drivers to wear their seat belts.

(Countermeasures Manual Case No. A8-*Company Driver Manuals*)

The carrier agreed to the recommendation and, in addition, instructed guards at each terminal gate to check drivers before leaving to ensure they were complying with the company's policy. This simple solution, which had been overlooked by everyone, turned out to be the key in reducing this type of injury to zero.

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### CASE # 3.

An Indiana-based school bus contractor was experiencing a high number of accidents caused by driver inattention. After examining all of the carrier's accidents, the Safety Specialist determined that they all were occurring during the month of June. The Safety Specialist also came to the conclusion that no specific driver or vehicle was responsible for the accidents. It seemed that the drivers, in general, were becoming inattentive because summer was near and they were anticipating the end of the school year. Further analysis revealed that the Safety Director held two safety meetings a year with the drivers, one in September and another in February.

### COUNTERMEASURE:

The Safety Specialist recommended to the carrier that it should begin holding safety meetings sometime in April and provide each driver with a one-page handout in the period prior to the start of these meetings to keep them alert.

(Countermeasures Manual Case No. A7-*Fleet Safety Program and Supervision*)

This simple solution turned out to be the key in reducing these accidents to zero. When the Safety Director was asked why he had never noticed this problem, he replied "This was right there in front of me, but I just never had the time to sit down and look at it in this manner!"

**CASE # 4.**

A Utah-based carrier, which conducts the majority of its business west of the Mississippi River, was experiencing a high number of accidents.

After discussion with some drivers and management officials, an analysis by the Safety Specialist revealed that a high number of accidents occurred during the same time of day on a three-to-five mile section of a certain interstate, heading west. Apparently, drivers were being blinded as they came over the crest of a very large hill at sunset.

**COUNTERMEASURE:**

The Safety Specialist discussed the situation with management and recommended that the carrier change the time its drivers were being dispatched. The carrier agreed with the recommendation and immediately began to dispatch drivers an hour earlier or an hour later in order to avoid driving over the hill at sunset. This change eliminated the accidents.

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**CASE # 5.**

During a review of a large Indiana-based household goods carrier that operates over 5,000 tractor-trailers, a Safety Specialist discovered that the carrier was experiencing a high number of rear-end collisions. Some of these accidents caused damage to the extent that they were reportable to the DOT. Most, however, were of a lesser amount but still added to the carrier's cost of operation.

**COUNTERMEASURE:**

The Safety Specialist recommended the installation of brake and turn signal lights at the top of the carrier's trailers.

(Countermeasures Manual Case No. B6-*Turning Left and Right*)

(Countermeasures Manual Case No. C10-*Vehicle lighting and Conspicuity*)

This reduced accidents almost immediately.

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**CASE # 6.**

During a review of a Washington-based grocery company, operating over 100 tractor trailers primarily in urban areas, the Safety Specialist discovered an accident pattern - an inordinate number of right turn accidents. Some of the accidents caused damage to the extent that they were reportable to DOT. Most, however, caused damages in a lesser amount but still added to the carrier's cost of operation.

**COUNTERMEASURE:**

The Safety Specialist discussed the findings with the carrier and recommended the installation of turn signals at a higher level on trailers.

(Countermeasures Manual Case No. B6-*Turning Left and Right*)

(Countermeasures Manual Case No. C10-*Vehicle Lighting and Conspicuity*)

The carrier agreed and also applied signs to the back of each trailer, on the right side, warning of wide turns. Accidents dropped dramatically over a very short period of time.

## **CASE # 7.**

During a recent review, a Washington-based carrier that operates over 2,400 tractor trailers west of the Mississippi River was found to have a high number of loss-of-control accidents during adverse driving conditions.

## **COUNTERMEASURE:**

The Safety Specialist recommended the carrier require drivers to attend a safety meeting.

(Countermeasures Manual Case No. A7-*Fleet Safety Program and Supervision*)

(Countermeasures Manual Case No. A9-*Driver Training Aids*)

To promote attendance, the carrier scheduled ten Saturday meetings in various locations and required all drivers to attend one. Drivers were paid to attend the meetings and coffee and doughnuts were provided. The safety meeting consisted of approximately four hours of training on the Federal Motor Carrier Safety Regulations, driving in adverse conditions, and other general safety information. Within a short period of time, the company records indicated a 60 percent reduction in accidents.

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## **CASE # 8.**

An Oregon-based produce hauler, generally running from Portland to Los Angeles was having a very high number of backing accidents. Considering the areas in which they were required to load and unload, the carrier had not found the number of accidents unusual. An analysis by the Safety Specialist revealed that the carrier was using qualified but relatively inexperienced drivers in sleeper teams. They were paid for load/unload time whether they actually had to do the work or not. Although most of the backing accidents involved damage costing less than \$1,000, one dock worker had been crushed between a trailer and the dock, which emphasized the danger inherent in backing accidents.

## **COUNTERMEASURE:**

The Safety Specialist recommended that each driver attend a safety meeting, and that a safety notice be distributed to all drivers requiring them to assist each other during backing maneuvers.

(Countermeasures Manual Case No. A7-*Fleet Safety Program and Supervision*)

(Countermeasures Manual Case No. A9-*Driving Training Aid*)

(Countermeasures Manual Case No. B3-*Start-Up/Back-Up*)

The carrier agreed with the suggestion and required every driver to attend a safety meeting (meetings were held on several Saturdays to allow attendance by all). Drivers were paid overtime and coffee and donuts were furnished. The meeting contained about four hours of training on proper procedures for backing. In addition, a safety notice was distributed in driver's paychecks instructing them to assist each other during backing maneuvers. Backing accidents dropped quickly, and because of increased driver awareness, there was a reduction in other types of accidents as well.

**CASE # 9.**

A Missouri-based farm commodity and hazardous material transporter was experiencing a high number of accidents. Examination of all its accidents revealed that they occurred during bad weather and that the majority of them were caused by drivers who were not paying attention to the road conditions, (that is, they were driving too fast for the weather).

**COUNTERMEASURE:**

The Safety Specialist recommended that the carrier implement a safe driver recognition/incentive program and a driver training program geared to avoiding accident situations and to driving in adverse weather conditions.

(Countermeasures Manual Case No. A3-*Safe Driving Recognition*)

(Countermeasures Manual Case No. A4-*Driver Safety Infractions*)

(Countermeasures Manual Case No. A7-*Fleet Safety Program and Supervision*)

(Countermeasures Manual Case No. B11-*Driving in Adverse Conditions*)

The carrier agreed with the recommendations, and now holds quarterly safety meetings with 95 percent driver participation. Any driver who attended the previous meeting and was accident free during the quarter receives a \$150 U.S. Savings Bond. The carrier also, implemented a driver training program and classroom instruction on accident situations and driving in adverse weather conditions. After the carrier took this proactive stance, its accident rate improved from 0.88 to 0.37 over 12 months.

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**CASE # 10.**

A city-based carrier that operates over 30 delivery trucks was experiencing a high number of accidents.

An analysis by the Safety Specialist revealed that a majority of accidents occurred within a two to three block area downtown every Thursday between nine and ten in the morning. The analysis also revealed that drivers were paid every Thursday morning, and that a number of banks are located within the problem area. Apparently, after they were paid in the morning, drivers would stop at the banks while on-duty to cash their paychecks.

Driving in this highly congested area during rush hour placed both the driver and vehicle in extremely unfavorable conditions. Cashing the checks during the morning rush hour traffic was placing both the driver and vehicle in the worst possible place at the busiest time of the day and led to the high number of accidents.

**COUNTERMEASURE:**

After further discussion with management officials, the Safety Specialist recommended that the carrier change the time the drivers were being paid. The carrier agreed with the recommendation and began paying the drivers at the end of the day. The change forced drivers to cash their paychecks after work while off-duty, and eliminated the accidents.



### **CASE # 11.**

An Illinois-based carrier that operates over 200 tractor trailers was experiencing a high number of accidents. An analysis by the carrier's Safety Director revealed that the majority of these accidents fell into three main categories. The carrier was experiencing:

- too many right turn accidents
- too many backing accidents
- too many right lane change accidents.

### **COUNTERMEASURE:**

After further discussion among management officials, the carrier developed a program that was based on the three accident types that were occurring most frequently. Each accident type was assigned a different color dot sticker: red, blue, and yellow. The number one accident situation (right turns) was assigned a red dot sticker. The number two accident situation (backing) was assigned a blue dot sticker. The number three accident (right lane change) was assigned a yellow dot sticker. The dots were placed on the right side mirror of the motor carrier's vehicle as a safety reminder to drivers who had accidents.

The carrier also placed a large red sticker halfway back on the side of trailers to aid drivers when making right turns. If a driver could not see the colored sticker in the right side mirror, then he/she had not pulled far enough out to execute the turn.

After implementing the program, the carrier began to see accident numbers starting to decrease considerably.

After a few months, however, the carrier became lax in seeing that the dots remained affixed. Accident rates started to rise again. The Safety Director states that the carrier now makes sure that when a unit comes through the shop, the safety dots are checked and replaced if needed. Other carriers could easily copy this program to meet their own company's most frequent accident situations.

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### **CASE # 12.**

Motor carriers in California and Tennessee have recently experienced accidents involving the driver's inability to see other vehicles because of poor visibility (specifically, in fog or dust storms).

### **COUNTERMEASURE:**

According to researchers here and in Europe, use of front and rear running lights during daylight hours would save lives and prevent injuries, since many crashes are caused by poor visibility. These running lights can be:

- special additional lights
- reduced-intensity headlights for daytime use, or
- high-intensity parking lights.

In Finland, researchers found that, during a six-year period, the use of daytime running lights in winter reduced daytime crashes by 21 percent. In Sweden, results were similar: crashes decreased by 11 percent. Finland, Sweden, and Denmark now require all drivers to use daytime running lights. In 1989, Canada passed legislation requiring that all new cars, trucks, vans, and buses be equipped with front lights that turn on whenever the engine is running. According to James White of Transport Canada, about 20 percent of all

drivers voluntarily use running lights in the daytime. By 1994, he said, enough new vehicles will be on the road to bring the total to two in five vehicles with lights on in the daytime.

Of course, all of these countries are in the north where it can be relatively dark much of the day in the winter. What about here in the United States? Some States already require the use of headlights just after sunrise, before sunset, or whenever visibility is poor. New York recently passed a law requiring the use of low-beam headlights whenever it rains, snows, sleet, or hail. Any time one has windshield wipers on in New York, headlights must be switched on or the driver risks being ticketed for an equipment violation (a \$100 fine).

In one study, the Insurance Institute of Highway Safety (a research organization supported in part by the insurance industry) equipped 2,000 trucks and vans with automatic daytime running lights for a year. Crashes decreased by 13 percent in bad weather and 7 percent at other times - less than the reduction shown in several European studies but enough to lend support to the use of daytime running lights.

A government study completed in April 1990 showed that, in light levels equivalent to early morning or twilight, drivers were able to see vehicles with running lights sooner than those with no lights. The lights improved visibility and provided drivers going 55 miles per hour with about three extra seconds to brake or take other action to prevent a crash. Several car makers, including General Motors, Chrysler, Ford, and Volvo, voiced support for daytime running lights as a way to decrease highway deaths and injuries. General Motors has filed a petition with the National Highway Traffic Safety Administration for clearance to install daytime running lights.

Daytime running lights won't affect gas mileage by much: for every \$10 spent on gas, they would cost an extra nickel (0.5 percent, according to a study by the Canadian government). Some people may object that these daytime lights can be blinding for other drivers, especially when reflected in rearview mirrors and for older drivers. One government study indicated that glare in the rearview mirror during daytime could be a problem, though the age of the driver was not a significant factor. The right intensity for running lights under different conditions "should be considered" in recommending lamp design, the study concluded.

Meanwhile, it makes good safety sense to switch on low-beam headlights in adverse weather conditions, at daybreak, dusk, and on dark and overcast winter afternoons.

## REVENUE NECESSARY TO PAY FOR ACCIDENT LOSSES

This table shows the dollars of revenue required to pay for different amounts of costs for accidents.

**It is necessary for a motor carrier to generate an additional \$1,250,000 of revenue to pay the cost of a \$25,000 accident, assuming an average profit of 2%. The amount of revenue required to pay for losses will vary with the profit margin (as shown in chart below).**

### REVENUE REQUIRED TO COVER LOSSES

YEARLY ACCIDENT COSTS	VS. PROFIT MARGIN				
	1%	2%	3%	4%	5%
\$1,000	\$100,000	\$50,000	\$33,000	\$25,000	\$20,000
5,000	500,000	250,000	167,000	125,000	100,000
10,000	1,000,000	500,000	333,000	250,000	200,000
25,000	2,500,000	1,250,000	833,000	625,000	500,000
50,000	5,000,000	2,500,000	1,667,000	1,250,000	1,000,000
100,000	10,000,000	5,000,000	3,333,000	2,500,000	2,000,000
150,000	15,000,000	7,500,000	5,000,000	3,750,000	3,000,000
200,000	20,000,000	10,000,000	6,666,000	5,000,000	4,000,000

**Accident costs consist of any /or all of the following:**

- Vehicle Damage
- Loss of Revenue
- Administrative Costs
- Police Reports
- Cargo Damage
- Possible Effects on Cost of Insurance
- Possible Effect on Cost of Workmen's Compensation Insurance
- Towing
- Storage of Damaged Vehicle
- Damage to Customer Relationships
- Legal Fees
- Customer's Loss of Revenue Directly Attributable to Accident



<b>ACCIDENT REGISTER</b>
FROM _____, 20____ TO _____, 20____

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[illegible]



## THE HAZARDS OF OPERATING MULTIPLE TRAILERS

5 axle tractor-  
semitrailer with  
45 ft trailer



3 axle tractor-  
semitrailer with  
27 ft trailer



turnpike double  
45 ft trailers



8-trail double  
27 ft trailers



Rocky Mountain  
double—45 ft &  
27 ft trailers



California truck  
full trailer



65 ft conventional  
double—27 ft  
trailers



triple 27 ft trailers



# On Guard



U.S. Department of Transportation

## TRUCKERS AND CARRIERS!

According to accident reports cited by the National Transportation Safety Board (NTSB) from a study on heavy trucks: accidents involving combination tractors with multiple trailers indicate that many truck drivers are making the transition from driving single trailer units to combination tractors with multiple trailers (doubles and triples) with little or no training on the hazards of operating these units . . . and without any behind-the-wheel training. (1)

Do not assume that a driver of a semi-trailer combination unit can easily make the switch to a multiple trailer unit with little or no special training. The controllability and maneuverability of these multiple trailer units can vary greatly between straight truck and even single-unit trailer configurations.

For example:

- The small tractor steering movements or braking applications, particularly in a lane change, are magnified by a second trailer and can reach uncontrollable levels, producing considerable yawing and subsequent rollover.
- The chances of the rear trailer unit rolling over during a sharp turn vary with the combination trailer unit configuration. The last trailer of a triple with 27-foot trailers is 3½ times more apt to roll over in a sharp turn than a 5-axle tractor semi-trailer with a 45-foot trailer. (2)
- The height and positioning of cargo in a combination vehicle are even more important than in straight trucks in determining the likelihood of a rollover.
- The type of cargo also contributes to the likelihood of a rollover. With bulk liquids, for instance, sudden steering movements or braking applications can cause product surge in a tank vehicle and shifting of the vehicle's center of gravity.

The following accident summaries from the NTSB study on heavy trucks illustrate the controllability and maneuverability hazards in operating combination tractors with multiple trailers:

- The driver of a twin trailer combination unit lost control when he steered sharply left to pass an automobile on an interstate highway. Both trailers began swinging from side to side. The first trailer then struck the automobile, and the rear trailer broke away and rolled over.

(next page)

# On Guard

- The driver of a twin trailer combination unit was taking a right curve on a downward mountain grade, when he felt the rear trailer begin a violent counter-clockwise rotation. The rear trailer broke away, rolled over onto its left side, slid through a guardrail and down a mountain slope before it came to rest.
- The driver of a twin trailer combination unit ran off the right side of an interstate highway and struck a concrete drainage cover at the outer edge of the shoulder. When he steered left to return the unit to the roadway, the rear trailer broke away and rolled over.
- A driver of a twin trailer unit on a two-lane highway made a sharp right steering maneuver onto the grassed shoulder to avoid an oncoming automobile. When the driver steered back onto the roadway, the rear trailer began weaving laterally; it broke away from its coupling pin and rolled over.
- The driver of a twin trailer unit was taking a right curve on a downgrade when the rear trailer began weaving on the roadway. The weaving became rapid; the trailer broke away from its coupling pin and rolled over on the roadway.
- The driver of a twin cargo tank trailer combination unit was taking a left curve on a downward mountain grade when the rear trailer began swinging laterally. As the unit continued through the curve, the rear trailer broke away and rolled over. The driver had 10 years' experience driving combination units but only 2 weeks driving twin trailer units.

*These were experienced single trailer unit drivers in the above examples. Yet, they reported having training ranging from no formal training in the operation of multiple trailers to a maximum of a single trip behind the wheel of a similar vehicle with a senior driver. Most of the drivers only had training on the inspection and hookup of multiple trailers.*

Drivers must have adequate driver training, both on the road and in the classroom, to make them aware of the variables that influence the controllability and maneuverability of the multiple trailer configurations and how these variables compare to and contrast with those that affect operation of the semi-trailer combination.

**DRIVERS SHOULD NOT BE DRIVING THESE MULTIPLE TRAILER COMBINATION UNITS WITHOUT THIS SPECIALIZED TRAINING.**

(1) "Case Summaries of 189 Heavy Truck Accident Investigations," National Transportation Safety Board, Safety Study, NTSB/SS-88/06.

(2) "Influence of Size and Weight Variables on the Stability and Control Properties of Heavy Trucks," R. D. Ervin, R. L. Nisonger, C.C. MacAdam, and P. S. Fancher, University of Michigan Transportation Research Institute, 1983.



# On Guard



U.S. Department of Transportation

## STEEL AND ALUMINUM COIL LOAD SECUREMENT!



On August 5, 1991, two aluminum coils fell off a U.S.-based carrier's trailer near Gananoque, Ontario, killing four members of a family in a passenger car, all U.S. residents. One of the deceased had just returned from service in Operation Desert Storm.

On October 5, 1992, several 7,000-pound steel coils fell off a carrier's trailer on I-190 near Buffalo, New York, striking several cars and killing four occupants.

On May 18, 1993, a 20-ton coil of steel fell off a carrier's trailer on I-290 near Buffalo, injuring the driver. Luckily, no one was killed and the injuries were minor.

Between those dates, several other incidents of lesser severity occurred in Western New York in which steel or aluminum coils fell off vehicles. In all instances, improper load securement was a factor.

To determine the extent of the load securement problem, the New York Department of Transportation implemented a commercial vehicle roadside inspection policy in February 1993 in the Western New York area, devoting 1 day each week to load securement. Approximately 50 percent of the vehicles checked were placed out of service for load securement problems.

Investigation of the past incidents and the recent inspections in New York indicate that load securement is a major problem and that it is not limited to New York-based carriers. The problem appears to be of national and international scope.

The FHWA is advising motor carriers to pay particular attention to their load securement policies and practices. Specific attention should be paid to the number of tie-down assemblies, the condition and strength of the tie-downs and anchors, and any blocking or bracing that may be necessary. Webbing, chains, cables, and tie-down anchors must be inspected for wear and damage, and the blocking and bracing must be inspected for adequacy before any load is transported.

Sections 393.100 through 393.106 of the Federal Motor Carrier Safety Regulations specify the load securement requirements applicable to interstate carriers, and the Commercial Vehicle Safety Alliance (CVSA)/FHWA "out-of-service" criteria identify defects which will cause a carrier to be placed out of service. Carriers should acquaint themselves with both.

The CVSA has also developed "Cargo Securement Tie-Down Guidelines" and other related training materials.